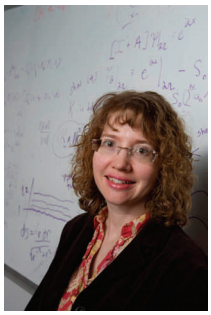
DR. JENNIFER MUELLER VISITING PROFESSOR AT ELECTRICAL IMPEDANCE TOMOGRAHPY LABORATORY IN SAO PAULO, BRAZIL


Professor Jennifer Mueller

Each day at the Electrical Impedance Tomography Laboratory in the Department of Mechanical Engineering at the University of Sao Paulo (USP), Brazil, physicians and engineers, graduates and undergraduates are working together to advance a technique for heart and lung imaging from electric fields. For the spring semester of 2007, USP was also home to CSU mathematics professor Jennifer Mueller.

Electrical impedance tomography (EIT) is a relatively new imaging technique in which electrodes are placed on the surface of the body, a low-amplitude current is applied on the electrodes, and the resulting voltages are measured. An inverse problem is solved to determine the conductivity distribution in the interior, and the results are plotted to form an image. One advantage of EIT is that it serves as a visualization of regional organ function and has very good resolution in time. Patients with ARDS (acute respiratory distress syndrome) have collapsed alveoli, or airways, in the lungs. The treatment for this condition is mechanical ventilation, which reinflates the airways over time. Eventually, the patient recovers and can be weaned from the ventilator. However, alveolar collapse, cyclic closing and reopening of the airways, and lung over-distention are dangerous side effects of mechanical ventilation that can be prevented by choosing the proper settings for the ventilator.


Dr. Raul Gonzalez-Lima and Dr. Julio Aya in the electrical impedance imaging lab at USP in Sao Paula, Brazil

Mathematics plays a very central role in EIT technology, both in questions of system design and the development of reconstruction algorithms for solving the inverse problem. Professor Mueller has been working in EIT for the past 10 years, and first met the USP group at the First Mummy Range Workshop in EIT at the Pingree Park campus of CSU in 2002. Her decision to collaborate with the Sao Paulo group on site was motivated by her desire to contribute to the field in a practical manner. "I love EIT," Mueller said. "There are deep mathematical problems and simultaneously a developing technology that can save lives. I like to see an idea through from the theoretical to the practical aspects."


Ph.D. students Miguel Vallejo and Natalie Herrera will be visiting from the University of Sao Paulo

Professor Jennifer Mueller is co-advising the Ph.D. theses of two University of Sao Paulo students in EIT. Both Miguel Vallejo and Natalia Herrera plan to spend the 2008-2009 academic year in residence at Colorado State this fall.

Sidebar notes:

Acute Respiratory Distress Syndrome (ARDS)

**** ARDS is a life-threatening condition in which inflammation of lungs and fluid in the air sacs (alveoli) lead to low blood oxygen levels***

**** Death rate is 20 to 30% and survivors often suffer permanent lung damage, memory loss, or other brain damage***

**** Treatment is mechanical ventilation through an endotracheal tube delivering high concentrations of oxygen at a continuous pressure***

**** Side effects of treatment include ventilator-induced pneumonia and lung damage***

University of Sao Paulo

**** Located in Sao Paulo, Brazil, a city of 18 million people and the largest city in the southern hemisphere***

**** The only tuition-free university in Brazil***

**** The EIT group in Brazil recently received the nationwide Werner von Siemens Award 2006, first prize on Innovative Technologies.***

HILARY SPRIGGS UNDERGRADUATE FACILITATOR


Hilary Spriggs

During the previous two years, the Department of Mathematics Chair, Simon Tavener, has created a new administrative professional position to assist the department chair and associate chair with their duties. The position of Undergraduate Facilitator has been filled by Hilary Spriggs.

Hilary is an alumnus of our department, earning both her undergraduate and MS degrees from CSU. Previously, she worked for the department as an instructor and was selected and promoted to her current position in 2006.

Hilary's current duties include Ram Welcome, undergraduate advising, coordinating MATH130, and assisting faculty with RamCT and ARIESWeb. She teaches two courses per semester. In addition, Hilary generates initial teaching and class schedules and organizes room schedules and graders.